NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SHUTTLE MISSION

STS-51G

PRESS KIT
JUNE 1985

ARABSAT A; MOROLOS A; TELSTAR 3-D; SPARTAN 1

STS-5IG INSIGNIA

S85-31266 -- The STS-51G insignia illustrates the advances in aviation technology in the United States within a relatively short span of the twentieth century. The flags of the French (Baudry) and Saudi Arabian (Al-Saud) payload specialists appear next to their name at the bottom of the insignia.

The NASA insignia design for space shuttle flights is reserved for use by the astronauts and for other official use as the NASA Administrator may authorize. Public availability has been approved only in the form of illustrations by the various news media. When and if there is any change in this policy, which we do not anticipate, it will be publicly announced.

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RELEASE NO: 85-8 **June 1985**

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RELEASE NO: 85-83

EIGHTEENTH SHUTTLE FLIGHT TO FEATURE INTERNATIONAL CREW AND CARGO

The upcoming flight of Discovery, the 18th of the Space Shuttle program, will be distinctively international as NASA flies the first French and Arab payload specialists and a cargo that includes American, Mexican and Arabian domestic communications satellites.

Also aboard are three west German small self-contained payloads, also known as Getaway Specials.

Discovery's fifth launch is scheduled for no earlier than 7:33 a.m. EDT on June 17, 1985, from Complex 39-A at the Kennedy Space Center, Fla.

Aboard the ship will be a crew of seven, commanded by Shuttle veteran Daniel Brandenstein, pilot on the eighth Shuttle mission. He will be joined by pilot John Creighton and mission specialists Shannon Lucid, Steven Nagel and John Fabian. Fabian is also a Shuttle veteran, having flown on STS-7.

French Payload Specialist Patrick Baudry will carry out biomedical experiments similar to those flown by a French cosmonaut aboard a Soviet manned mission. Sultan Salman Al-Saud will conduct 70 mm photography over Saudi Arabia, photograph a fluids experiment and participate in the French Postural Experiment.

Discovery's payload bay will have a full load with the three communications satellites, a deployable/retrievable spacecraft called Spartan 1 and six Getaway Special canisters. Several mid-deck experiments will also be flown, including one for the Strategic Defense Initiative Organization and a materials processing furnace.

The Shuttle will be launched from KSC into a 220-mile orbit inclined 28.45 degrees to the Earth's equator. The mission is planned for 7 days.

The Mexican communications spacecraft is called Morelos-A. It is a version of she Hughes US 376 satellite, a number of which have already been deployed by the Space Shuttle. Morelos-A is the first of two domestic communications satellites that will provide advanced telecommunications to even the most remote parts of Mexico.

Morelos will be deployed on the first day of the flight on Discovery s sixth orbit of the Earth.

Arabsat-A is owned by the Arab Satellite Communications Organization. Built by Aerospatiale, it will provide telecommunications links between the member nations. Arabsat will be deployed from the Shuttle 5 cargo bay about 26 hours into the flight during orbit 18.

Telstar 3-D is an American domestic communications satellite owned by American Telephone and Telegraph (AT&T). Telstar 3-D will provide telecommunications services to the continental United States, Alaska, Hawaii and Puerto Rico. It will be deployed from the Shuttle on orbit 32 just before the 48-hour point in the mission.

All three communications spacecraft will be spring-ejected from the cargo bay of the orbiter. On each, a small attached rocket called the Payload Assist Module will be ignited about 45 minutes after deployment.

Between deployment and PAM ignition, the Shuttle will be maneuvered to a safe distance. The end effector camera on the robot arm will be used to observe the perigee kick motor firing on each of the spacecraft.

The PAM stage propels a satellite to a transfer orbit which reaches out as far as 22,300 miles above Earth.

A second small rocket motor is then fired on each spacecraft to circularize the orbit at that distance. The period of a satellite in geosynchronous orbit is synchronized with the Earth's rotation so it always remains over the same region of the globe.

This characteristic enables continuous communications services to he provided to a broad region of Earth directly beneath the spacecraft.

Spartan is designed to carry a variety of experiments. The name is an acronym standing for Shuttle Pointed Autonomous Research Tool for Astronomy. It can be deployed, flown in formation with the orbiter and then can be retrieved and returned to Earth.

Using the Shuttle’s remote manipulator arm, Spartan will be deployed on flight day 4 and will be retrieved on the sixth day of the mission.

X-Ray sensors aboard Spartan 1 will search for hot gas clouds in galaxy clusters and perform a survey of X-Ray sources in our own galaxy -- the Milky Way.

The Spartan program is an extension of the NASA sounding rocket program and is sponsored by the Goddard Space Flight Center, Greenbelt, Md., to provide low-cost, high-quality observations.

Payload specialist Baudry and the French biomedical experiments had been scheduled to fly on mission 51-E in early March. When that flight was canceled, Baudry and the experiments were reassigned to flight 51-G.

The French Postural Experiment (EPE) will help scientists better understand the human body's postural adaptation in space, while the French Echocardiograph Experiment will investigate other aspects of space adaptation.

Another middeck experiment, the Automated Directional Solidification Furnace, is located in three middeck lockers and will be used for materials processing research.

The Strategic Defense Initiative Organization is flying an experiment called the High-Precision Tracking Experiment.

There are six Getaway Specials mounted along the sides of Discovery's payload bay. The three West German payloads will be used to study materials processing in space and the behavior of liquid propellants.

The U.S. Air Force and U.S. Naval Research Laboratory are sponsoring an investigation of the ultraviolet radiation environment in space in another Getaway Special canister. A fifth canister contains a package of nine student experiments in biological and physical science. A Goddard Space Flight Center investigation of a developmental beat transfer system is in the sixth canister.

Discovery 5 return to Earth is planned to begin with a deorbit burn at 7 days 40 minutes into the flight on orbit 111.

Landing on the dry lake bed at Edwards Air Force Base, Calif., will occur almost exactly I hour later, at about 9:14 a.m. EDT, June 24, 7 days, 1 hour and 41 minutes mission elapsed time.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS)

51-G BRIEFING SCHEDULE

Time (EDT)	Briefing	Origin
T-l Day		
9:00 a.m.	Arabsat	KSC
9:30 a.m.	Morelos-A	KSC
10:00 a.m.	Telstar-3D	KSC
10:30 a.m.	Spartan 1	KSC
11:00 a.m.	French Science	KSC
11:30 a.m.	Arab Science	KSC
12:00 Noon	Automated Directional	
Solidification Furnace (ADSF)	KSC	
12:30 Getaway Specials	KSC	
2:00 p.m. Prelaunch Briefing	KSC	
T-Day		
8:30 a.m.	Post Launch Press Conference	KSC
Launch Through End-of-Mission		
Times announced on NASA Select	Flight Director Change-of- Shift Briefings	JSC
Landing Day		
10:30 a.m.	Post Landing Briefing	DFRF

GENERAL INFORMATION

NASA Select Television Transmission

The schedule for television transmissions from the orbiter and for the change-of-shift briefings from the Johnson Space Center, Houston, will be available during the mission at the Kennedy Space Center, Fla.; Marshall Space Flight Center, Huntsville, Ala.; Johnson Space Center; and NASA Headquarters, Washington, D.C. The television schedule will be updated on a daily basis to reflect changes dictated by mission operations.

NASA has leased from RCA Satcom F-2R, Transponder 13 (half transponder), to carry NASA Select television from launch through landing. Satcom F-2R is located 72 west longitude. Transponder 13 transmits on a frequency of 3954.5 MHz.

To support commercial/educational users, NASA leases a full transponder during peak hours of Shuttle flights via Satcom F-lR, Transponder 18. Satcom F-1R (C Band) is located 139 degrees w. longitude. Transponder 18 transmits on a frequency of 4060.0, horizontal polarization. Operating hours (EDT) are:

June 16 (T-l)	1:00 p.m. to 3:00 p.m.
June 17 (Flight Day 1)	3:00 a.m. to 8:00 p.m.
June 18 (Flight Day 2)	8:00 a.m. to 8:00 p.m.
June 19 (Flight Day 3)	6:00 a.m. to 8:00 p.m.
June 20 (Flight Day 4)	5:00 a.m. to 7:00 p.m.
June 21 (Flight Day 5)	4:00 a.m. to 6:00 p.m.
June 22 (Flight Day 6)	8:00 a.m. to 5:00 p.m.
June 23 (Flight Day 7)	7:00 a.m. to 5:30 p.m.
June 24 (Landing Day)	6:00 a.m. to 11:00 a.m.

Special Note to Broadcasters

Beginning June 12, and continuing throughout the mission, approximately-15 minutes of audio interview material with the crew of 51-G will be available to broadcasters by calling 202/269-6572.

Status Reports

Status reports on countdown progress, mission progress, on-orbit activities and landing operations will be produced by the appropriate NASA news center.

Briefings

Flight control personnel will be on 8-hour shifts. Change-of-shift briefings by the off-going flight director will occur at approximately 8-hour intervals.

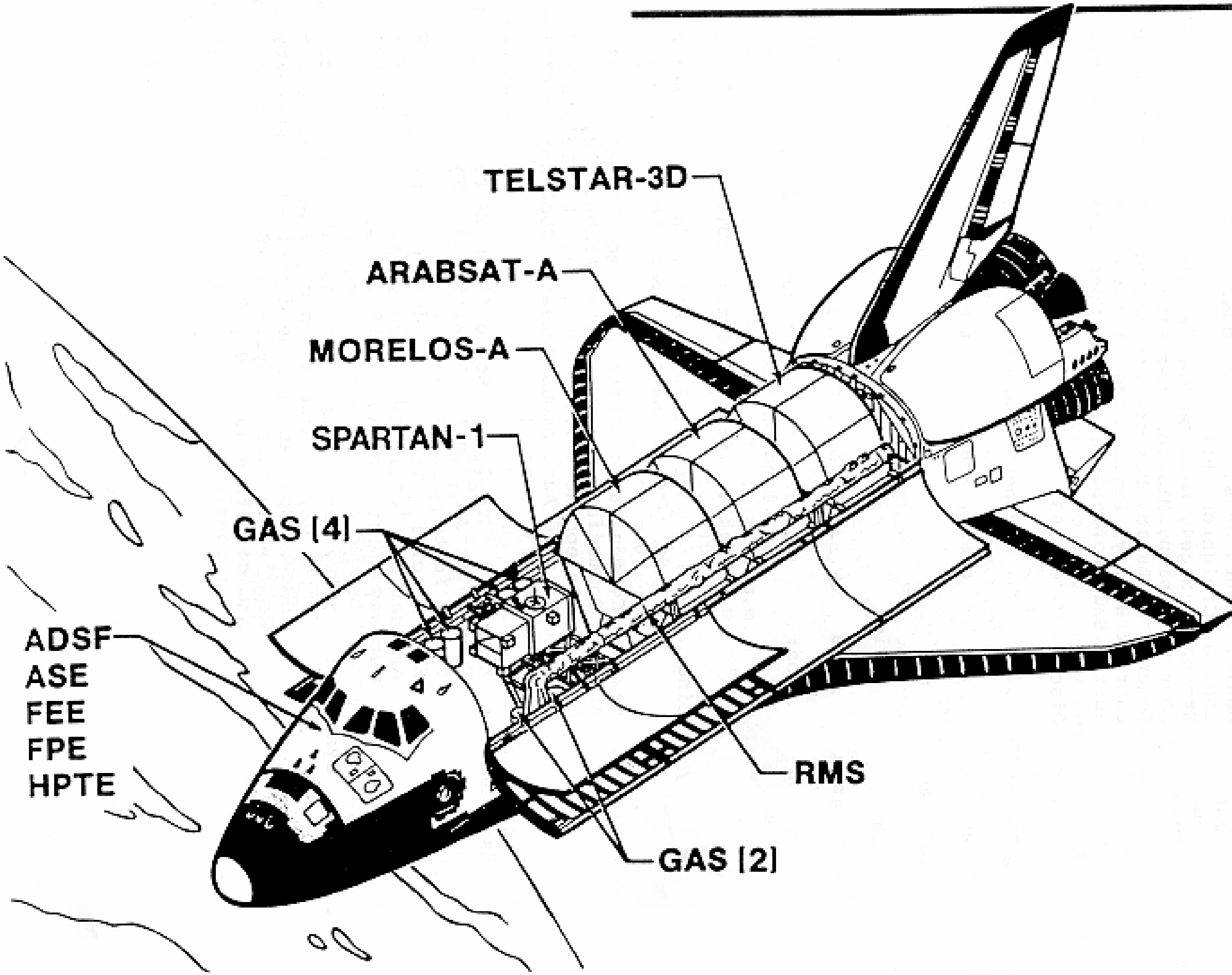
Transcripts

Transcripts of the change-of-shift briefings will be available at the Shuttle news centers.

SHUTTLE MISSION 51-G -- QUICK LOOK FACTS

Crew:	Daniel C. Brandenstein, Commander John O. Creighton, Pilot Steven R. Nagel, Mission Specialist John M. Fabian, Mission Specialist Shannon W. Lucid, Mission Specialist Patrick Baudry, Payload Specialist Sultan Salman Al-Saud, Payload Specialist
Orbiter:	Discovery (OV-103)
Launch Site:	Pad 39-A, Kennedy Space Center, Fla.
Launch Date/Time:	June 17, 1985; 7:33 a.m. EDT
Window:	4 minutes
Orbital Inclination:	28.45 degrees
Orbital Altitude:	219 5. mi. by 220 5 mi
Mission Duration:	7 days, land on flight day 8 (111 full orbits, land on 112)
Landing Date/Time:	June 24, 1955; 9:14 a.m. EDT
Primary Landing Site: Weather Alternate:	Edwards Air Force Base, Calif.; Kennedy Space Center, Fla.
Payloads:	Mexican Communications Satellite (Morelos-A) Arabian Communications Satellite (Arabsat-1B) American Telephone & Telegraph Satellite (Telstar-3D) Shuttle Pointed Autonomous Research Tool for Astronomy (Spartan 1)
Experiments:	Automated Directional Solidification Furnace (ADSF) French Echocardiograph Experiment (FEE) French Postural Experiment (FPE) High-Precision Tracking Experiment (HPTE) Arabsat Scientific Experiments (ASE) Getaway Specials (GAS)
Flight Synopsis:	Deploy three communications satellites: Morelos on flight day 1, Arabsat on day 2 and Telstar, flight day 3. Spartan will be deposited in space by the Remote Manipulator System (ELMS) robot arm on day 4 and be retrieved on day 6.

National STS Program
STS 51-G Cargo Configuration



TRAJECTORY SEQUENCE OF EVENTS

Event	Orbit	MET (d:h:m)	Tig Burn Duration (m:s)	Delta V (fps)	Orbit HP/HA (Stat Mi)
Launch		0:00:00			
SRB Sep		0:00:02			
MECO		0:00:09			
ET Sep		0:00:09			
OMS-2		0:00:43	2:58	278	219/220
Deploy Morelos B		0:08:05			219/221
OMS-3 Sep Burn	6	0:08:20	0:09	11	220/227
Deploy Arabsat 1B		01:02:23			220/226
OMS-4 Sep Burn	18	01:02:38	0:09	11	220/234
Deploy Telstar	32	01:23:47			220/232
OMS-5 Sep Burn	32	02:00:02	0:09	11	220/241
Deploy Spartan	51	03:04:28			220/239
RCS 1	51	03:04:34	0:03	1	220/239
RCS 2	51	03:04:49	0:08	2	221/239
RCS Mnvr	67	04:05:21	0:15	4	220/238
RCS Phase Mnvr	77	04:20:41	0:16	4	218/237
RCS Mnvr 78	78	04:22:47	0:.4	0.1	218/238
RCS Mnvr 79	79	04:23:45	0:13	3	219/238
RCS Mnvr 80	80	05:01:06	0:19	5	220/239
Retrieve Spar					
OMS-6 Mnvr	82	05:04:44	0:52	87	158/191 (nm)
Deorbit Burn	111	07:00:40	2:38	270	13/220
Entry Interface	112	07:01:10			
Landing EDW 17	112	07:01:41			

SUMMARY OF MAJOR ACTIVITIES

Flight Day 1

Ascent
SRB Ignition
Begin Pitchover
Max Dynamic Pressure
SRB Separation
Main Engine Cutoff
External Tank Sep
OMS-2 (178 Sec, 278 FPS)

On Orbit
Payload Bay Doors Open
TV of Deploy Activities
Morelos Deploy
OMS-3 Sep Mnvr (9 Sec, 11 FPS)
Morelos Perigee Kick Motor
VTR Playback - Morelos Deploy

Flight Day 2
TV- Deploy Activities Arabsat
Arabsat Deploy
OMS-4 Sep Mnvr (9 Sec, 11 EPS)
Arabsat Perigee Kick Motor
VTR Playback of Arabsat Deploy

Flight Day 3
TV - Deploy Activities
Telstar Deploy
OMS-5 Sep Mnvr (9 Sec, 11 FPS)
Telstar Perigee Kick Motor
VTR Playback of Telstar Deploy
DTO 909 Activities

Flight Day 4
TV Deploy Activities
Spartan Deploy
RCS Sep MNVR 1 (3 Secs, 1 EPS)
RCS Sep MNVR 2 (8 Secs, 2 FPS)
VTR Playback of Spartan Deploy
FLIGHT PAY 5
RCS Phase Mnvr (15 Secs, 4 FPS)

Flight Day 6
TV - Rendezvous Activities
RCS Phase MNVR (16 Secs, 4 EPS)
RCS MNVR (.4 Sec, .1 FPS)
RCS MNVR (13 Secs, 3 FPS)
RCS MNVR (19 Secs, 5 FPS)
OMS-6 Altitude Adjustment MNVR (52 Secs, 87 FPS)
VTR Playback - Rendezvous

Flight Day 7
RCS Hot Fire Test
TV - Crew Press Conference

Flight Day 8
Begin Deorbit Preparation
Descent
OMS Deorbit Burn (149 Sec, 270 FPS)
Entry Interface
Begin s-Band Blackout
End 5-Band Blackout
Entry/TAEM Interface
Landing (Edwards 17)

STS 51-G PAYLOAD AND VEHICLE WEIGHTS

	Pounds
Arabian Communications Satellite (Arabsat-1B)	7,658
Pallet-Attach Structure	2,703
Mexican Communications Satellite (Morelos-A)	7,557
Pallet-attach structure	2,442
Spartan I	2,190
Spartan Equipment	2,275
Telstar-3D	7,546
Pallet-Attach Structure	2,452
Two Getaway specials (Bay 2)	910
Two Getaway specials (Bay 3)	910
Two Getaway Specials (Bay 6)	910
Gas Controller	
Automated Directional Solidification Furnace (ADSF)	265
French Echocardiograph Experiment (FEE)	206
French postural Experiment (FPE)	37
High-Precision Tracking Experiment (HPTE)	20
Medical DSO	15
Orbiter With Cargo at Liftoff	256,524
Total Vehicle At Liftoff	4,515,043
Orbiter At Landing	205,000

FRENCH MIDDECK EXPERIMENTS

The French Echocardiograph Experiment (FEE) and the French Postural Experiment (FPE) will fly on flight 51-0 as part of a cooperative project with the Centre National d'Etudes Spatiales (CNES) of France.

The objectives of these experiments are to obtain on-orbit data regarding the response to weightlessness off the cardiovascular and sensorimotor systems. The system was previously flown on a Soviet Salyut mission in July 1982.

These experiments accompany and will be performed by the French payload specialist Patrick Baudry with participation from other crew members.

French Echocardiograph Experiment (FEE)

The human cardiovascular system is adapted to compensate for the constant pull of gravity on Earth. During the first few days of spaceflight the crew is subjected to some significant changes as their systems adapt to the sharp reduction of gravitational effects. Such effects include the temporary pooling of blood in the head and upper torso, with changes in the size of some heart cavities and flow rates in major arteries.. Data on these changes and the readaptation to gravity after the mission have important implications for crew health and safety.

The French echocardiograph uses a non-invasive, ultrasonic technique to obtain data on these events. The equipment weighs 176 pounds and is contained within two middeck double lockers. One double locker holds the electronics; the second holds the video tape recorder, the control monitor and a stowage drawer.

Payload specialist Baudry will perform the FEE supported by mission specialist Shannon Lucid. The experiment will be performed at launch plus 4 to 6 hours and one other time during that day. Baudry and Lucid will then separately perform the experiment at approximately the same time each flight day. Preflight and post flight collection sessions will be required to correlate data collected in flight.

The echocardiograph was built by Matra-Interelec, Paris, and the sensors were built by the Tours-based company, Vermon. The principal investigator is L. Pourcelot, University of Tours, and Dr. Antonio Gull, Toulouse Hospital. The FEE is managed by the Laboratoire de Biophysique Medicale, Faculte de Medecine, Tours, France.

French Postural Experiment (FPE) I

The human sensorimotor functions may be categorized into four areas: muscular tone, posture, orientation and movement. All these functional modes interact to operate within the constant field of gravity experienced on Earth. Without the physical bias and point of reference provided by gravity, these sensor I-motor functions must adapt. It is the objective of the EPE to learn more of this adaptive process. A better understanding of this process may provide new insights as to how these functional modes interact on Earth.

Parametric measurements of electromyographic activity of muscles, angular head movement and up-and-down eye movement will be conducted. Measurements will be obtained using biochemical electronic sensors, data tape recorders and a camera. The five in-flight objectives of the FPE are: posture and movement; posture and vision; vestibule-ocular reflex; optokinetic nystagmus (involuntary oscillation); and spatial memory.

During in-flight operation, the experiment will be conducted on a non-interference basis with the planned crew activity once a day by two crewmembers throughout the mission. Baudry and the Saudi payload

specialist will be trained to perform the FPE and to assist each other. Each experimental session will require 65 minutes, including set-up and calibration, plus an additional 30 minutes for unstowage and stowage.

The FPE equipment weighs 17.6 lb. and is stored in two mid-deck lockers. The experiment hardware was developed by the Centre National de Recherche Scientifique (CNRS) Laboratoire de Physiologie Neurosensorielle, Paris, and built by three companies -- Aeta, of Velizy; Erems, of Balma: and Comat of Toulouse --under a CNES contract. principal investigators are Prof. Alain Berthox and Prof. Francis Lestienne, CNRS. The experiment is managed by Laboratoire de Physiologie Neurosensorielle, CNRS.

ARABSAT COMMUNICATIONS SATELLITE

Arabsat is a communications spacecraft designed for launch by the Space Shuttle orbiter. Once deployed, it is boosted to its operational synchronous orbit of about 22,300 statute miles by a Payload Assist Module-P (PAM-D). Main body of the spacecraft is rectangular with deployable solar arrays extending north and south along the pitch axis in flight. A graphite epoxy central cylinder transmits loads from the satellite through the adapter to the launch vehicle. The cylinder also houses the propulsion system's propellant tanks, the antenna feed and reflector brackets for high stability.

Two solar array wings are independently oriented toward the sun by rotational drive assemblies. The arrays are deployed once the spacecraft has ended the transfer orbit phase of flight.

Once in geosynchronous transfer orbit, the outer panel on each array is deployed with release of four primary stirrups which hold the arrays. After final firing of the apogee motor, the remaining three panels are deployed.

C-band transmit and receive antennas are on the east and west sides of the spacecraft. An S-band antenna faces Earth.

A low-thrust, l00-lb. bipropellant apogee engine is in the main body. Providing a high specific impulse, it is fired at the transfer-orbit apogee to arrive at the precise geosynchronous orbit.

About 80 seconds after deployment, when Arabsat is about 200 feet from Discovery, the PAM-D is jettisoned by a signal from the master control station in Riyadh, Saudi Arabia, through the COMSAT Launch Control Center, Washington, D.C. Actuators then deploy Arabsat's solar panels.

The Arabsat spacecraft weighs 2,800 lb. and the PAM-D, 4,863 lb.

ARABSAT PAYLOAD SPECIALIST ACTIVITIES

Sultan Salman Al-Saud, the Saudi Arabian Arabsat payload specialist, will take part in four scientific investigations: Earth Observation, Phase Separation, Ionized Gas and French Postural Experiments.

Al-Saud will photograph Saudi Arabia during Discovery's 49 daylight passes over its southwestern region with a 70 mm camera from orbit. The photographs will be studied by Saudi scientists at the research institute, the University of Petroleum and Minerals in Dhahran, Saudi Arabia. They also will be compared with previous data from multispectral scanner, thematic mapper and radar images (SIR-A and SIR-B). Analysis will cover geological features, sand dune morphology, hydrogeological features, turbidity in the Red Sea, urban areas and forestry.

In another experiment, two liquids which do not mix on Earth will be studied in microgravity. They are referred to as "phases." Using Phase Separation Experiment hardware developed at the NASA Marshall Space Flight Center, Al-Saud will place various concentrations of Saudi, Kuwaiti and Algerian oils mixed with water in a hand-held, transparent Plexiglas container with 15 chambers, each having a small metal mixing ball. He will shake the container and mount it in front of a fluorescent light, then photograph the separation and record his observations.

The film will be studied by Saudi investigators at the university of petroleum and Minerals and the Marshall Space Flight Center. Results may shed light on the process of enhanced oil recovery and behavior of oil spills and pollution.

The Ionized Gas Experiment (ICE) requires that Sultan Salman Al-Saud, using the Orbiter Discovery's TV cameras, record thruster firings in specified configurations to study the mechanics of thruster plumes and the degree off Ionization produced. This experiment is part of a Saudi Arabian student Ph.D. thesis at Stanford university. purpose is to assess the thruster plumes effect on operations measurements and communications associated with space vehicles. The data obtained also will be analyzed at the university of petroleum and Minerals for a better understanding of the impact of gas particles on solid surfaces. Al-Saud also will photograph the Arabsat satellite's rocket engine firing.

Al-Saud will assist French payload specialist Patrick Baudry in the postural Experiment on the adaptation mechanism of the sensory motor activities. This includes posture stabilization and orientation and the role of vision in posture control and reflex mechanisms that stabilize the retina. Requiring about 3 hours, the experiment will be performed before, at the beginning, during the middle and last day of flight two times a day.

In another activity, Al-Saud will try to observe the crescent of the new moon with the unaided eye from orbiter windows as it becomes visible close to the western horizon immediately after sunset June 17 or 18 at the end of the Muslim religious holiday, Ramadan

MORELOS COMMUNICATIONS SATELLITE

Morelos is one of two spacecraft scheduled for launch by NASA's Space Transportation System for the Secretariat of Communications and Transportation, Mexico. It will provide advanced telecommunications to the most remote parts of Mexico including educational TV, commercial programs over the national TV network, telephone and facsimile services, and data and business transmissions. Television programming will originate in at least 12 principal cities. Cultural, educational and athletic events will be televised nationwide. The Hughes Space and Communications Group is prime contractor.

Morelos is a spin-stabilized gyrostat design with a despun antenna and communications payload. Two cylindrical solar panels, one fixed and one extendable, supply prime power to the spacecraft. At launch, Morelos is mated to the PAM-II) stage and the antenna reflector and aft solar panel are stowed. The PAM-fl) stage supplies the necessary impulse for injection into a transfer orbit. Shortly after separation of the spacecraft from the orbiter Discovery, an omnidirectional antenna is deployed.

Morelos' two cylindrical solar panels telescope when the spacecraft is in orbit. In launch position, with antenna reflector folded down, Morelos is 9 ft., 4 in, high. In orbit with panels extended and antenna erected, it is 21 ft., 8 in. high. It is 7 ft., I in. in diameter and weighs 1,422 lb. at the beginning of life in orbit. Four thrusters using 293 lb. of hydrazine propellant provide orbit and attitude control during the satellite's 9-year planned mission life.

From low Earth orbit, the cradle's protective sunshield is opened and a spin table at the base spins the satellite to 55 rpm to provide gyroscopic stability. Four springs push the satellite into space; 45 minutes later, an onboard sequencer fires the McDonnell Douglas payload assist module. A Morton Thiokol Star apogee kick motor places the satellite into a circular synchronous orbit. Near its operating position, the reflector antenna and electronics shelf are despun and achieve close pointing accuracy. The satellite drifts into final orbit and is placed in operating position with onboard thrusters.

TELSTAR 303

The third in the Telstar 3 series of communications satellites will be deployed on flight day 3 during the ascending half of orbit 34. When combined with the single sideband Earth station equipment developed by AT&T Laboratories, each Telstar 3 satellite is capable of relaying nearly four times the number of simultaneous telephone calls commonly carried by satellites of the previous generation. Along with the company 5 other spacecraft, Telstar 303 will transmit AT&T's Skynet family of satellite services.

The current AT&T Communications space network consists of two Telstar 3 satellites and two Comstar satellites leased from COMSAT. AT&T Communications -- the AT&T organization responsible for long-distance and international services -- launched the first of its Telstar 3 satellites in 1983 on a Delta rocket. The second rode into space during Discovery's maiden mission in August 1984. This particular satellite is scheduled to replace a Comstar satellite that is nearing the end of its service life.

Designed for all types of domestic communications, the Telstar 3 satellites operate in the 6/4 GigaHertz C-band and serve the continental United States, Hawaii, Puerto Rico or Alaska, depending on exact orbital placement over the equator. Each satellite is able to relay hundreds of video teleconferences, 24 color television programs or billions of bits of high speed data and facsimile signals. The third Telstar 3 will be placed at 125 degrees w. longitude. It has a total of 24 working transponders, the equipment that receives and transmits communications signals, as well as six amplifiers held in reserve.

In addition, improved batteries and solid state amplifiers will allow the Telstar 3 series of satellites to operate 3 years longer than the previous generation of satellites -~ for 10 rather than 7 years.

The Telstar 3 series of satellites was designed by AT&T Bell Laboratories and built by the Hughes Aircraft Corp. using the Hughes 376 spacecraft. Each Telstar 3 satellite consists of two primary sections containing the communications units and the support systems, surrounded by two concentric cylinders. Once in space, the outer cylinder drops down about 6 ft. exposing the solar cells on the inner cylinder. With its antenna fully deployed in space, the satellite will have an overall length of 22.4 fit. and a diameter of 7.1 Et. The two cylinders are covered with 15,588 solar cells. When the satellite is in the sun's path, these cells, thin silicon chips, covert solar energy to electrical power to energize the satellite. When not operated by solar power, the Telstar 3 satellite uses nickel-cadmium, long-life batteries.

The Telstar 3 spacecraft will use a PAM-fl) for transfer orbit insertion. Ground controllers at AT&T's Hawley, Pa., Satellite Management and control Facility will monitor the satellite until it reaches a selected apogee, or high point, at which time they will fire the onboard apogee kick motor to circularize the orbit at the geosynchronous altitude of 22,300 mi.

SPARTAN 1

Spartan 1 is the first in a series of Shuttle launched, short duration free-flyers designed to extend the capabilities of sounding rocket class experiments.

The primary mission of Spartan 1 is to perform medium resolution mapping of the X-Ray emission from extended sources and regions, specifically the hot (10,000 degrees C) gas pervading a large cluster of galaxies in the constellation Perseus and in the galactic center and Sco-X-2. in addition the X-Ray emission from the nuclear region of our own Milky way galaxy will be mapped.

Spartan 1 is a rectangular structure, 126 by 42 by 48 in.; weight 2,223 lb. including 300 lb. of experiments. it will be deployed and retrieved using the Canadian-built robot arm. Total deployed time will be approximately 45 hours.

The satellite is designed to accommodate experiments that require stellar or solar pointing and establishes its inertial reference using gyros and a cold gas Attitude Control System (ACS). The ACS, controlled by an internal micro-computer, will obtain an initial fix from the sun and two guide stars, Vega and Deneb, and then point the detectors at the desired celestial targets.

All scientific and engineering data is recorded by an on-board tape recorder. No telemetry or command link is provided. Power is provided by internal batteries. When -Spartan is retrieved and the Shuttle returns, the recording tape will be removed and sent to the Goddard Space Plight Center where scientific data tapes will be generated.

The Spartan 'family" of short duration satellites are designed to minimize operational interfaces with the orbiter and crew. The only interfaces are latching, release and berthing support, deployment and retrieval, and turn-on and checkout by the crew prior to deployment. By keeping the interfaces to a minimum, it is possible to operate the Spartan autonomously and minimize both demands on the orbiter timeline and impact on other experiments.

Spartan 1 is built by the Attached Shuttle Payloads Project (ASP) at the Goddard Space Flight Center at a cost of approximately $3.5 million.

The Spartan program manager is John A. Glaab, Office of Space Science and Applications, NASA Headquarters, Washington, D.C. ASP project manager at Goddard is Sterling Smith; David Shrewsberry is the mission manager. The project scientist is Dr. Ray Cruddace at the Naval Research Laboratory (NRL), Washington, D.C., and the principal investigator is Dr. Gilbert Fritz of NRL.

GETAWAY SPECIALS

G-025 - Liquid Sloshing Behavior in Microgravity

This experiment will examine the behavior of a liquid in a tank under microgravity conditions. It is representative of phenomena occurring in satellite tanks with liquid propellants. A reference fluid in a hemispherical model tank will be subjected to linear acceleration inputs of known levels and frequencies. The dynamic response of the tank liquid system will be recorded and analyzed.

The results will validate and refine mathematical models describing the dynamic characteristics of tank-fluid systems. This in turn will support the development of future spacecraft tanks, in particular the design of propellant management devices for surface tension tanks.

The experiment was provided by MBB/ERNO, the prime contractor for the Spacelab. it is mounted on a Payload Support System (PASS) flight unit, identical to the system designed and developed by MBB/ERNO for the Federal German materials science project MAUS (in German, the acronym for materials science autonomous experiments), described below. PASS is a standardized structure, power supply and data processing unit.

G-027 - Slipcasting Under Microgravity Conditions

The process of slipcasting uses a ceramic slurry to form complicated shapes of hollow bodies. On Earth, this process is limited in applications because of gravitational influences on the dispersed particles in the slurry. sedimentation can be avoided only by the use of materials with equal densities or by the utilization of a stabilizing additive. However, the latter may be harmful to the desired properties of the slip-cast product.

The goal of this experiment is to demonstrate with model materials that slipcasting is possible in microgravity, even with unstabilized suspensions using mixtures of powders with different density, grain-size and concentration. Ceramic and/or metal powders are homogeneously mixed in solid paraffin. Rods of these solid slurries are pressed into cartridges against the ends of porous ceramic rods mounted in the lower halves of the cartridges.

During weightlessness, 13 samples of these solid slurries will be melted. Then slipcasting will be started by heating the lower parts of the cartridges. After cooling and solidification, the paraffin will preserve the slipcast layers as well as the residual slurries for later examination with respect to their structure and particle distribution.

Mission 51-G will be the fifth flight of MAUS payloads, with 10 experiments having been carried into space since November 19B2. The project is managed by the German Aerospace Research Establishment (DFVLR) acting on behalf of the German Minister of Research and Technology (BMFT). The industrial prime contractor is MBB/ERNO.

G-028 - Fundamental Studies in Manganese-Bismuth

The objective of the experiment is to produce manganese-bismuth (MnBi) specimens with better magnetic properties than currently is possible under Earth gravity. other experiments have shown that during melting and solidification of alloys of the MnBi system in the absence of sedimentation and buoyancy and other forces promoting segregation, such as surface tension, likewise have no effect. Compared with the original materials there has been a distinct increase in the proportion of ferromagnetic MnBi.

During this flight, MnBi, having interesting magnetic applications, will be prepared under microgravity conditions.

G-034 - Texas Student Experiments

This payload features 12 different biological and physical science experiments designed by high school students from El Paso and Isleta, Texas. The effort was supported financially by the school districts involved and by businesses and other citizens in the area. A list of experiments, students and their schools follows;

Growth of Lettuce Seeds	David Bowden	Hanks HS
Barley Seed Germination	Gisele Bryant	Coronado HS
Growth of Brine Shrimp	Donald Cake	Bassett Int.
Germination of Turnip Seeds	Pricillo Campos	Irvin HS
Liquid Laser	Clay Casares	Hanks HS
Planaria Regeneration	Monica Chavez	Coronado HS
Wicking of Fuels	Kelly Foster	Hanks ES
Effectiveness of Antibiotics on Bacteria	Karen Herman	Morehead Tnt.
Growth of Soil Mold	Rebecca Lopez	Bowie NH
Crystallization in Zero-G	Michael Moore	Coronado NH
Symbiotic Growth of Chlorella and Kefir in Microgravity	Rudy Santini	Isleta MS
	Steven Walker	Eastwood MS
DRAM Chips	John Thurston	Canyon Hills

A 13th experimenter, James Martinez, intends to make a post-flight examination of plant genetic structure with the returned biological materials.

G-314 - Space Ultraviolet Radiation Experiment (SURE)

This experiment has been designed to measure the natural radiation field in the upper atmosphere at extreme ultraviolet (EUV) wavelengths, between 50 and 100 nanometers. The hardware consists of a spectrometer which separates the wavelength band into two intervals of 128 discrete wavelengths. The radiation intensity at each wavelength is measured and stored on a tape recorder.

The experiment instrument was developed in the Space Science Division at the Naval Research Laboratory (NRL) . it is the first of a series to be developed at NRL which ultimately will have the capability of observing “ionospheric weather.” It is envisioned that someday satellites will be stationed at high altitudes to provide global pictures of ionospheric weather conditions. Ionospheric storms, or the effects of such phenomena as solar flares or eruptions, could be monitored and their evolution followed. Effects on communication systems could be observed immediately anywhere in the world.

The principal investigator of the SURE project is Dr. Robert Conway and the project engineer is Kenneth wolfram, both of NRL. Co-investigators are Drs. George Carruthers, Robert McCoy, Robert Meier, George Mount and Dianne Prinz, all of NRL.

G-471 - Capillary Pump Loop (CPL)

This experiment is the first of a thermal control system using capillary pumps. These pumps contain no moving parts but work on the principle of capillary action by which plants and trees transport water and nutrients from their roots to their leaves against the force of gravity. The purpose off the experiment is to demonstrate the thermal control capability of a capillary-pumped system under zero-gravity conditions for ultimate use in large scientific instruments, advanced orbiting spacecraft and Space Station components.

The CPL consists of two capillary-pumped evaporators with integral heaters, a fluid loop charged with ammonia, a condenser plate (heat sink) and various control electronics. Each pump contains a wick of porous material which is saturated with the working fluid. As heat is added, the fluid evaporates and travels to the condenser, thus transporting the heat at a nearly constant temperature from the heat source to its sink. The evaporation process produces the pressure gradient, or pumping action, that circulates the fluid.

Principal investigator is Roy McIntosh of NASA's Goddard Space Flight Center, Greenbelt, Md.

AUTOMATED DIRECTIONAL SOLIDIFICATION FURNACE (ADSF)

The Automated Directional Solidification Furnace (ADSF) will be carried into space for the first time on flight 51-G. Experiments to be carried out in the furnace are expected to demonstrate the capability of the ADHE equipment and provide preliminary scientific results on magnetic composites. Future missions are expected to demonstrate the feasibility of producing improved magnetic composite materials for commercial use. These materials could eventually lead to smaller, lighter, stronger and longer-lasting magnets for electrical motors used in aircraft and guidance systems, surgical instruments and transponders.

In ground-based directional solidification, gravity-driven convection causes an undesirable stirring or mixing of the material; resulting in an unequal distribution of the composite material as it resolidifies.

The furnace-is specially designed to melt a long, slim magnetic composite sample and then resolidify the molten metal material with a more uniform distribution of the composite material for further processing.

Four furnace modules are included in the ADSF, each of which will process a single sample. The samples being used during the 51-G mission are a manganese and bismuth composite. They will be processed varying the speed of both the melt and resolidification. Material processed during the mission will then be compared with samples of the same metallic alloys processed in laboratories on Earth.

The ADSF flight hardware is housed in three separate containers. It weighs about 250 lb. and occupies the space of five crew lockers in the orbiter middeck. Operation of the experiment is highly automated, requiring the crew only to initiate operation of each of the four furnaces. All of the ADSF flight hardware is reusable.

The furnace was built by the General Electric Co. Principal investigator for the ADSF experiment is Dr. David Larson of the Grumman Aerospace Corp. Project manager is Fred Reeves and mission manager is Ed Valentine, Marshall Space Flight Center. The program is managed by Marshall for the Microgravity Science and Applications Division at NASA Headquarters Washington, D.C.

HIGH-PRECISION TRACKING EXPERIMENT

The Strategic Defense Initiative Organization will fly the first of a series of technology development experiments aboard flight 51-G. The experiment, called a High-Precision Tracking Experiment, is designed to test the ability of a ground Laser Beam Director to accurately track an object in low-Earth orbit.

The High-Precision Tracking Equipment payload consists of an 8-inch diameter retroreflector mounted in a cylindrical housing. when removed from its storage locker, the retroreflector assembly will be attached to the Shuttle's middeck side hatch window in order to receive and reflect a low-energy laser beam projected from a test facility located on the island of Maui, Hawaii.

In addition to the High-Precision Tracking Equipment, the Strategic Defense Initiative organization has requested NASA support for experiments on two Shuttle flights a year beginning in 1987. Prior to that time, a variety of cabin and other experiments may be flown.

STS-51G CREWMEMBERS

S85-32877 -- Kneeling in front are astronauts Daniel C. Brandenstein (left) and John O. Creighton, commander and pilot, respectively. Astronauts Shannon W. Lucid, Steven R. Nagel, and John M. Fabian, mission specialist (l.-r.) join Payload specialists Sultan Salman Abdelazize Al-Saud (second right) and Patrick Baudry on the back row.

BIOGRAPHICAL DATA

DANIEL C. BRANDENSTEIN, 42, Captain, USN, is mission commander. Born in Watertown, Wis., he became a NASA astronaut in 1978. Brandenstein was pilot of the eighth Space Shuttle mission in 1983, with the first night launch and landing. He was ascent CAPCOM for the first and second flights of the Space Shuttle Columbia.

Brandenstein received a bachelor of science degree in mathematics and physics from the University of Wisconsin In 1965.

Following graduation, he entered active duty with the Navy, participating in combat deployments on the USS Constellation and USS Ranger to Southeast Asia where he flew 192 combat missions. He was attached to VX-5 for the conduct of operational tests of A-6 weapons and subsequently conducted tests of electronic warfare systems in various Navy aircraft. He has logged 4,100 hours In 24 different types of aircraft and has 400 carrier landings.

JOHN O. CREIGHTON, 42, Commander, USN, is pilot. He became an astronaut in 1978 and has held a variety of technical assignments in support of the Space Shuttle Program.

A native of Orange, Texas, he was graduated from the U.S. Naval Academy at Annapolis in 1966 with a bachelor of science degree. He received a master of science in administration of science and technology from George Washington University in 1978.

Creighton flew F-4Js and made two combat deployments to Vietnam aboard the USS Ranger. He was a project test pilot and served as F-14 engine development project officer. He became a member of the first F-14 operational squadron, completing two deployments aboard the USS Enterprise to the Western Pacific, returning to the United States to be assigned to the Naval Air Test Center's Strike Directorate as operations officer and 7-14 program manager. He has logged about 4,000 hours flying time, the majority in jet fighters, and completed 500 carrier landings and 175 missions.

STEVEN N. NAGEL, 38, Lieutenant Colonel, USAF, is one of three mission specialists. Born in Canton, Ill., he became a NASA astronaut in 1978. He served as backup entry CAPCOM for the second Shuttle flight and support crew and primary entry CAPCOM for STS-3. He is scheduled to be pilot of the Spacelab D-l mission later this year.

Nagel received a bachelor of science degree in aeronautical and astronautical engineering with high honors from the University of Illinois and a master of science degree in mechanical engineering from California State University, Fresno.

Nagel was an F-l00 pilot and served 1 year as T-28 instructor for the Laotian Air Force in Udorn, Thailand, before returning to the United States as A-7D instructor pilot and flight examiner. As a test pilot he worked on various projects which included flying the F-4 and A-7D. He has logged 4,900 hours --3,100 in jet aircraft.

JOHN M. FABIAN, 46, Colonel, USAF, a mission specialist, was born in Goosecreek, Texas. He flew as mission specialist on the seventh Shuttle flight in 1983.. He received a bachelor of science degree in mechanical engineering from Washington State University in 1962, a master of science in aerospace engineering from the Air Force Institute of Technology in 1964, and a doctorate in aeronautics and astronautics from the University of Washington in 1974.

An Air Force ROTC student at Washington State, Fabian was commissioned upon graduation in 1962. He spent 5 years as a KC-135 pilot and saw action in Southeast Asia, flying 90 combat missions. He has 4,000 hours flying time, including 3,400 in jet aircraft.

Fabian was selected as a NASA astronaut in 1978. As miss ion specialist, he worked extensively on satellite deployment and retrieval activities, including the development of the Canadian Remote Manipulator System. He h45 been selected to fly on the Life Science Spacelab mission 61-0 next year.

BIOGRAPHICAL DATA

SHANNON W. LUCID, 42, mission specialist, was born in Shanghai, China, but lists Bethany, Okla., as her hometown. She was selected as a NASA astronaut in 1978. She received a bachelor of science degree in chemistry, master of science and doctor of philosophy degrees in biochemistry from the University of Oklahoma.

Lucid's experience includes a variety of academic assignments such as teaching assistant at the University of Oklahoma's department of chemistry, senior laboratory technician at the Oklahoma Medical Research Foundation, chemist at Kerr-McGee, Oklahoma City, graduate assistant at the University's Health Science Center, and research associate with the Oklahoma Medical Research Foundation in Oklahoma City. She has logged 2,500 hours of commercial, instrument, multi-engine flying time.

Some of her technical assignments at NASA are at the Shuttle Avionics Integration and Flight Software Laboratories while with the rendezvous and proximity operations group. She has participated in payload and Shuttle testing and launch countdowns at the Kennedy Space Center.

PRINCE SULTAN SALMAN AL-SAUD, 28, payload specialist, is a native of Riyadh, Saudi Arabia. He is the son of Prince Salman bin Abdul Aziz and Sultanah Al-Sudairy, Saudi Arabia.

Sultan completed his elementary and secondary education in Saudi Arabia and received a bachelor of arts degree in mass communications from the University of Denver. He was a researcher in the foreign information department of the Ministry of Information and participated as deputy director with the Saudi Arabian Olympic Information Committee during the 1984 Olympiad in Los Angeles.

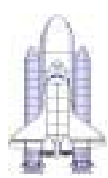
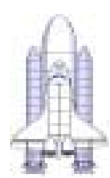
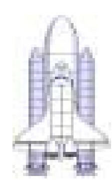
An experienced flier with a commercial pilot's license, he has logged more than 1,000 hours in jet aircraft and helicopters. Al-Saud is acting director of the Saudi Arabian Television Commercial Department.

PATRICK BAUDRY, 39, Lieutenant Colonel, French Air Force, payload specialist, is a native of Dual in the United Republic of Cameroon.

Baudry became a French astronaut in 1980. He was a member of the backup crew of the French-Soviet mission and was trained for scientific experiments in physiology, biology, materials processing in space and astronomy.

He joined the Ecole de l'Air (French Air Force Academy) in 1967 after an education in special mathematics. He has a master's degree in aeronautical engineering and became a fighter pilot in 1970. He has logged more than 4,000 hours flying time -- 3,300 in jet aircraft.

SHUTTLE FLIGHTS AS OF JUNE 1985
17 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM

	STS-51B 04/29/85 - 05/06/85	
STS-9 11/28/83 - 12/08/83	STS-41G 10/05/84 - 10/13/84	
STS-5 11/11/82 - 11/16/82	STS-41C 04/06/84 - 04/13/84	
STS-4 06/27/82 - 07/04/82	STS-41B 02/03/84 - 02/11/84	STS-51D 04/12/85 - 04/19/85
STS-3 03/22/82 - 03/30/82	STS-8 08/30/83 - 09/05/83	STS-51C 01/24/85 - 01/27/85
STS-2 11/12/81 - 11/14/81	STS-7 06/18/83 - 06/24/83	STS-51A 11/08/84 - 11/16/84
STS-1 04/12/81 - 04/14/81	STS-6 04/04/83 - 04/09/83	STS-41D 08/30/84 - 09/05/84
OV-102 **Columbia** **(6 flights)**	**OV-099** **Challenger** **(7 flights)**	**OV-103** **Discovery** **(4 flights)**